```
00001                         NAM     KEBUG2
00002                         OPT     O,S,NOG
00003               *
00004               *
00005               * BY C.SCHOENMAKERS DATE 79 04 28
00006               *
00007               * MONITOR PROGRAM FOR M6800 SYSTEM
00008               *
00009               * COMMANDS:
00010               * R=   PRINT USER REGISTERS
00011               * M=   PRINT / ALTER MEMORY LOC
00012               * PT=  PRINT DUMP WITH ASCII
00013               * PP=  PUNCH DUMP S1 FORMAT
00014               * L=   LOAD OBJECT PROGRAM
00015               * G=   GO TO USER PROGRAM (ADDRESS)
00016               * T=   HARDWARE TRACE MODE
00017               * O=   OFFSET CALCULATIONS
00018               * D=   SELECT DEVICE 1-F
00019               *
00020 F800                    ORG     $F800
00021               *
00022       F800    JMPTBL EQU     *         JUMP TABLE FOR FIXED REFERENC
00023 F800 7F FD24 XINCH  JMP     INEEF     INPUT CHAR
00024 F803 7F FD0D XOUTCH JMP     OUTFF     OUTPUT CHAR
00025 F806 7F FB56 XCONTL JMP     CONTRL    MONITOR ENTRY
00026 F809 7F FA85 XBADR  JMP     BADDR     BUILD ADDRESS
00027 F80C 7F FA93 XBYTE  JMP     BYTE      INPUT BYTE
00028 F80F 7F FAF8 XHEX   JMP     INHEX     HEX CHAR
00029 F812 7F FAA5 XOTSTG JMP     OUTSTG    OUTPUT CRLF
00030 F815 7F FAAD XPDATA JMP     PDATA1    PRINT STRING
00031 F818 7F FC82 XSADR  JMP     SADDR     GET BEGA ENDA
00032 F81B 7F FB10 XOUT4H JMP     OUT4HS    OUTPUT 4HEX
00033 F81E 7F FB12 XOUT2H JMP     OUT2HS    OUTPUT 2HEX
00034 F821 7F FB14 XOUTS  JMP     OUTS      OUTPUT SPACE
00035 F824 7F FDD5 XDSCIO JMP     DISCIO    ACTUAL DISC SOFTWARE
00036               *
00037               *
00038               * PROGRAM INCLUDES EXTENSIONS OF
00039               * THE M6800 INSTUCTION SET
00040               * LIKE THE HEMENWAY BIOS 68
00041               *
00042               * EXTENSIONS INCLUDE:
00043               *
00044               * 0 =   PSHALL      PUSH ALL REGISTERS ONTO STACK
00045               * 1 =   PULALL      PULL ALL REGISTERS FROM STACK
00046               * 2 =   TXAB        TRANSFER X TO A,B
00047               * 3 =   TABX        TRANSFER A,B TO X
00048               * 4 =   XABX        EXCANGE A,B WITH X
00049               * 5 =   PSHX        PUSH X ONTO STACK
00050               * 6 =   PULX        PULL X FROM STACK
00051               * 7 =   ADDXAB      ADD X TO A,B
00052               * 8 =   ADDABX      ADD A,B TO X
00053               * 9 =   ADDAX       ADD A TO X
00054               *10 =   ADDBX       ADD B TO X
```

```
00055                       *11 =   SUBXAB      SUBTRACT X FROM A,B
00056                       *12 =   SUBABX      SUBTRACT A,B FROM X
00057                       *13 =   SUBAX       SUBTRACT A FROM X
00058                       *14 =   SUBBX       SUBTRACT B FROM X
00059                       *15 =   MUL8        MULTIPLY A WITH B TO A,B
00060                       *16 =   MUL16       MULTIPLY A,B WITH X TO A,B,X
00061                       *17 =   MOVC        BLOCK MOVE (TO 255 CHAR)
00062                       *18 =   CMPC        BLOCK COMPARE
00063                       *19 =   MOVS        BLOCK MOVE STRING
00064                       *20 =   INDEX       X= X+ A*B
00065                       *
00066                       *
00067       F000      ACIA   EQU      $F000      CONSOLE DEVICE
00068       F002      ACIA2  EQU      $F002      TELETYPE DEVICE
00069       F004      TRACAD EQU      $F004      HARDWARE TRACE COUNTER
00070                       **************************************************
00071                       *
00072                       * SWIHDR SWI INPUT
00073                       *
00074 F827 30       SWIHDR TSX
00075 F828 EE 05           LDX      5,X
00076 F82A 4F            CLR A
00077 F82B F6 00           LDA B    0,X
00078 F82D C1 14           CMP B   #20
00079 F82F 23 05           BLS      *+7
00080                       *
00081 F831 FE F104         LDX      SWIVEC   GOTO VECTORED SWI
00082 F834 6E 00           JMP      X
00083                       *
00084 F836 58            ASL B                 *2
00085 F837 49            ROL A
00086                       *
00087                       *
00088                       * CALCULATE THE ADDRESS OF THE
00089                       * APPROPIATE PROCESSING ROUTINE
00090                       *
00091 F838 8D 00           BSR      STRT
00092                       *
00093 F83A 30       STRT   TSX
00094 F83B EB 01           ADD B    1,X
00095 F83D A9 00           ADC A    0,X
00096                       *
****ERROR  210
00097 F83F CB AD           ADDB    #DSPTAB
00098 F841 89 01           ADC A   #DSPTAB/256
00099                       *
00100 F843 A7 00           STA A    0,X
00101 F845 F7 01           STA B    1,X
00102 F847 FE 00           LDX .    0,X
00103 F849 EB 01           ADD B    1,X
00104 F84B A9 00           ADC A    0,X
00105                       *
00106 F84D 30            TSX
00107 F84E A7 00           STA A    0,X
```

```
00108 F850 E7 01               STA B  1,X
00109                  *
00110 F852 A6 02               LDA A  2,X
00111 F854 06                  TAP
00112 F855 EE 00               LDX    0,X
00113                  *
00114 F857 31                  INS
00115 F858 31                  INS
00116                  *
00117 F859 AD 00               JSR    0,X       CALL PROC. ROUTINE
00118                  *
00119 F85B 30                  TSX
00120 F85C 6C 06               INC    6,X
00121 F85E 26 02               BNE    *+4
00122                  *
00123 F860 6C 05               INC    5,X
00124 F862 3B                  RTI              RETURN TO USER
00125                  *****************************************
00126                  * USER REGISTER EQUATES
00127                  *
00128         0002     UC      EQU    2
00129         0003     UB      EQU    3
00130         0004     UA      EQU    4
00131         0005     UXH     EQU    5
00132         0006     UXL     EQU    6
00133         0007     URH     EQU    7
00134         0008     URL     EQU    8
00135                  *
00136                  ***********************
00137                  *
00138                  * PROCESSING ROUTINES
00139                  *
00140                  *
00141                  *****************************************
00142                  * PSHALL
00143                  *
00144 F863 34          PSHAL   DES
00145 F864 34                  DES
00146 F865 34                  DES
00147 F866 34                  DES
00148 F867 34                  DES
00149                  *
00150 F868 C6 09               LDA B  #9
00151 F86A 30                  TSX
00152                  *
00153 F86B A6 05       PSHALS  LDA A  5,X
00154 F86D A7 00               STA A  0,X
00155 F86F 08                  INX
00156 F870 5A                  DEC B
00157 F871 26 F8               BNE    PSHALS
00158                  *
00159 F873 C6 05               LDA B  #5
00160 F875 30                  TSX
00161                  *
```

```
00162 F876 A6 02     PSHALC LDA A   UC,X
00163 F878 A7 09             STA A   UC+7,X
00164 F87A 08               INX
00165 F87B 5A               DEC B
00166 F87C 26 F8            BNE     PSHALC
00167                *
00168 F87E 39               RTS
00169         ******************************************
00170                * PULALL
00171                *
00172 F87F 30        PULAL  TSX
00173 F880 C6 05            LDA B   #5
00174                *
00175 F882 A6 09     PULAC  LDA A   UC+7,X
00176 F884 A7 02            STA A   UC,X
00177 F886 08               INX
00178 F887 5A               DEC B
00179 F888 26 F8            BNE     PULAC
00180                *
00181 F88A C6 09            LDA B   #9
00182                *
00183 F88C A6 03     PULALS LDA A   URL-5,X
00184 F88E A7 08            STA A   URL,X
00185 F890 09               DEX
00186 F891 5A               DEC B
00187 F892 26 F8            BNE     PULALS
00188                *
00189 F894 31               INS
00190 F895 31               INS
00191 F896 31               INS
00192 F897 31               INS
00193 F898 31               INS
00194                *
00195 F899 39               RTS
00196         ******************************************
00197                * TXAB
00198                *
00199 F89A 30        TXAB   TSX
00200 F89B A6 05            LDA A   UXH,X
00201 F89D E6 06            LDA B   UXL,X
00202                *
00203 F89F A7 04     STAB   STA A   UA,X
00204 F8A1 E7 03            STA B   UB,X
00205                *
00206 F8A3 39               RTS
00207         ******************************************
00208                * TAPX
00209                *
00210 F8A4 30        TABX   TSX
00211 F8A5 A6 04            LDA A   UA,X
00212 F8A7 A7 05            STA A   UXH,X
00213 F8A9 A6 03            LDA A   UB,X
00214 F8AB A7 06            STA A   UXL,X
00215                *
```

```
00216 F8AD 39              RTS
00217               *****************************************
00218               * XABX
00219               *
00220 F8AE 30       XABX    TSX
00221 F8AF A6 05            LDA A   UXH,X
00222 F8B1 36              PSH A
00223 F8B2 E6 06            LDA B   UXL,X
00224 F8B4 8D EF            BSR     TABX+1
00225 F8B6 32              PUL A
00226 F8B7 20 E6            BRA     STAB
00227               *****************************************
00228               * PSHX
00229               *
00230 F8B9 34       PSHX    DES
00231 F8BA 34              DES
00232 F8BB 30              TSX
00233 F8BC 86 09            LDA A   #9
00234               *
00235 F8BE E6 02     PSHXA   LDA B   2,X
00236 F8C0 E7 00            STA B   0,X
00237 F8C2 08              INX
00238 F8C3 4A              DEC A
00239 F8C4 26 F8            BNE     PSHXA
00240               *
00241 F8C6 30              TSX
00242 F8C7 A6 05            LDA A   UXH,X
00243 F8C9 A7 09            STA A   UXH+4,X
00244 F8CB A6 06            LDA A   UXL,X
00245 F8CD A7 0A            STA A   UXL+4,X
00246               *
00247 F8CF 39              RTS
00248               *****************************************
00249               * PULX
00250               *
00251 F8D0 30       PULX    TSX
00252 F8D1 A6 09            LDA A   UXH+4,X
00253 F8D3 A7 05            STA A   UXH,X
00254 F8D5 A6 0A            LDA A   UXL+4,X
00255 F8D7 A7 06            STA A   UXL,X
00256               *
00257 F8D9 86 09            LDA A   #9
00258               *
00259 F8DB F6 08     PULXA   LDA B   8,X
00260 F8DD E7 0A            STA B   10,X
00261 F8DF 09              DEX
00262 F8E0 4A              DEC A
00263 F8E1 26 F8            BNE     PULXA
00264               *
00265 F8E3 31              INS
00266 F8E4 31              INS
00267               *
00268 F8E5 39              RTS
00269               *****************************************
```

```
00270                       * ADDXAB
00271                       *
00272 F8E6 30       ADXAB   TSX
00273 F8E7 8D C6            BSR     XABX+1
00274 F8E9 8D 03            BSR     ADABX+1
00275 F8FB 20 C2            BRA     XABX+1
00276               ****************************************
00277                       * ADDABX
00278                       *
00279 F8ED 30       ADABX   TSX
00280 F8EE A6 03            LDA A   UB,X
00281 F8F0 E6 04            LDA B   UA,X
00282                       *
00283 F8F2 AB 06    ADDAB   ADD A   UXL,X
00284 F8F4 A7 06            STA A   UXL,X
00285                       *
00286 F8F6 E9 05            ADC B   UXH,X
00287                       *
00288 F8F8 07       STAUXH  TPA
00289 F8F9 E7 05            STA B   UXH,X
00290 F8FB 6D 06            TST     UXL,X
00291                       *
00292 F8FD 27 02    TESTZ   BEQ     TESTZA
00293                       *
00294 F8FF 84 FB            AND A   #$FB
00295                       *
00296 F901 A7 02    TESTZA  STA A   UC,X
00297                       *
00298 F903 39               RTS
00299               ****************************************
00300                       * ADDAX
00301                       *
00302 F904 30       ADDAX   TSX
00303 F905 A6 04            LDA A   UA,X
00304                       *
00305 F907 C6 00    ADDZ    LDA B   #0
00306 F909 20 F7            BRA     ADDAB
00307               ****************************************
00308                       * ADDBX
00309                       *
00310 F90B 30       ADDBX   TSX
00311 F90C A6 03            LDA A   UB,X
00312 F90E 20 F7            BRA     ADDZ
00313               ****************************************
00314                       * SUBXAB
00315                       *
00316 F910 30       SBXAB   TSX
00317 F911 8D 9C            BSR     XABX+1
00318 F913 8D 03            BSR     SBABX+1
00319 F915 20 98            BRA     XABX+1
00320               ****************************************
00321                       * SBABX
00322                       *
00323 F917 30       SBABX   TSX
```

```
00324 F918 E6 05              LDA B  UXH,X
00325 F91A A6 06              LDA A  UXL,X
00326                *
00327 F91C A0 03              SUB A  UB,X
00328 F91E A7 06              STA A  UXL,X
00329                *
00330 F920 E2 04              SBC B  UA,X
00331 F922 20 D4              BRA    STAUXH
00332                **************************************
00333                * SUBAX
00334                *
00335 F924 30       SUBAX TSX
00336 F925 E6 04              LDA B  UA,X
00337                *
00338 F927 A6 06       SUB   LDA A  UXL,X
00339 F929 10                 SBA
00340 F92A A7 06              STA A  UXL,X
00341                *
00342 F92C E6 05              LDA B  UXH,X
00343 F92E C2 00              SBC B  #0
00344 F930 20 C6              BRA    STAUXH
00345                **************************************
00346                * SUBBX
00347                *
00348 F932 30       SUBBX TSX
00349 F933 E6 03              LDA B  UB,X
00350 F935 20 F0              BRA    SUB
00351                **************************************
00352                * INDEX
00353                *
00354 F937 8D 38     INDEX BSR    MPY8
00355 F939 37                 PSH B
00356 F93A 16                 TAB
00357 F93B 32                 PUL A
00358 F93C 30                 TSX
00359 F93D 20 B3              BRA    ADDAB
00360                **************************************
00361                * MUL 8
00362                *
00363 F93F 8D 30     MUL8  BSR    MPY8
00364 F941 30                 TSX
00365 F942 E7 03              STA B  UB,X
00366 F944 A7 04              STA A  UA,X
00367 F946 07                 TPA
00368 F947 5D                 TST B
00369                *
00370 F948 20 B3     JMPTZ BRA    TESTZ
00371                **************************************
00372                * MUL 16
00373                *
00374 F94A 86 10     MUL16 LDA A  #16
00375 F94C 36                 PSH A
00376 F94D 30                 TSX
00377 F94E 4F                 CLR A
```

```
00378 F94F 5F                CLR  B
00379 F950 66 06             ROR      UXH+1,X
00380 F952 66 07             ROR      UXL+1,X
00381                 *
00382 F954 24 04     MUL16L   BCC      MUL16S
00383 F956 EB 04             ADD  B   UB+1,X
00384 F958 A9 05             ADC  A   UA+1,X
00385                 *
00386 F95A 46        MUL16S   ROR  A
00387 F95B 56                 ROR  B
00388 F95C 66 06             ROR      UXH+1,X
00389 F95E 66 07             ROR      UXL+1,X
00390 F960 6A 00             DEC      0,X
00391 F962 26 F0             BNE      MUL16L
00392                 *
00393 F964 31                INS
00394 F965 30                TSX
00395 F966 E7 03             STA  B   UB,X
00396 F968 A7 04             STA  A   UA,X
00397                 *
00398 F96A 07                TPA
00399 F96B EA 05             ORA  B   UXH,X
00400 F96D AA 06             ORA  A   UXL,X
00401                 *
00402 F96F 20 D7             BRA      JMPTZ
00403                 ****************************************
00404                 * MPY 8
00405                 *
00406 F971 86 08     MPY8     LDA  A   #8
00407 F973 36                 PSH  A
00408                 *
00409 F974 4F                 CLR  A
00410 F975 30                 TSX
00411 F976 E6 06             LDA  B   UB+3,X
00412 F978 56                 ROR  B
00413                 *
00414 F979 24 02     MPY8L    BCC      MPY8S
00415                 *
00416 F97B AB 07             ADD  A   UA+3,X
00417                 *
00418 F97D 46        MPY8S    ROR  A
00419 F97E 56                 ROR  B
00420 F97F 6A 00             DEC      0,X
00421 F981 26 F6             BNE      MPY8L
00422                 *
00423 F983 31                INS
00424 F984 39                RTS
00425                 ****************************************
00426                 * MOVC
00427                 *
00428      0009       FROM     EQU      9
00429      000B       TOO      EQU      11
00430                 *
00431 F985 30        MOVC     TSX
```

```
00432 F986 E6 03              LDA B   UB,X        GET COUNT
00433                 *
00434 F988 EE 09     MOVC1    LDX     FROM,X
00435 F98A A6 00              LDA A   0,X         GET CHARACTER
00436                 *
00437 F98C 30                 TSX
00438 F98D EE 0B              LDX     TOO,X
00439 F98F A7 00              STA A   0,X         MOVE CHARACTER
00440                 *
00441 F991 30                 TSX
00442 F992 5A                 DEC B
00443 F993 27 0E              BEQ     MOVC3       DONE
00444                 *
00445 F995 6C 0A              INC     FROM+1,X
00446 F997 26 02              BNE     MOVC2
00447                 *
00448 F999 6C 09              INC     FROM,X
00449                 *
00450 F99B 6C 0C     MOVC2    INC     TOO+1,X
00451 F99D 26 E9              BNE     MOVC1
00452                 *
00453 F99F 6C 0B              INC     TOO,X
00454 F9A1 20 E5              BRA     MOVC1
00455                 *
00456 F9A3 39        MOVC3    RTS
00457                 ************************************************
00458                 * CMPC
00459                 *
00460      0009       PARM1    EQU     9
00461      000B       PARM2    EQU     11
00462                 *
00463 F9A4 30        CMPC     TSX
00464 F9A5 E6 03              LDA B   UB,X        GET COUNT
00465                 *
00466 F9A7 EE 09     CMP0     LDX     PARM1,X
00467 F9A9 A6 00              LDA A   0,X         GET A CHAR
00468                 *
00469 F9AB 30                 TSX
00470 F9AC EE 0B              LDX     PARM2,X
00471 F9AE A1 00              CMP A   0,X         MATCH?
00472 F9B0 26 10              BNE     CDONE       NO
00473                 *
00474 F9B2 30                 TSX
00475 F9B3 6C 0A              INC     PARM1+1,X
00476 F9B5 26 02              BNE     CMP1
00477                 *
00478 F9B7 6C 09              INC     PARM1,X
00479                 *
00480 F9B9 6C 0C     CMP1     INC     PARM2+1,X
00481 F9BB 26 02              BNE     CMP2
00482                 *
00483 F9BD 6C 0B              INC     PARM2,X
00484                 *
00485 F9BF 5A        CMP2     DEC B               ALL DONE?
```

```
00486 F9C0 26 E5            BNE     CMP0
00487                 *
00488 F9C2 30         CDONE  TSX
00489 F9C3 07                TPA
00490 F9C4 A7 02             STA A   UC,X     SET CC
00491 F9C6 E7 03             STA B   UB,X     SET B
00492                 *
00493 F9C8 39                RTS
00494                 ***************************************
00495                 * MOVS
00496                 *
00497 F9C9 30         MOVS    TSX
00498                 *
00499 F9CA EE 09      MOVS1   LDX     FROM,X
00500 F9CC A6 00              LDA A   0,X      GET CHAR
00501                 *
00502 F9CE 30                 TSX
00503 F9CF EE 0B              LDX     TOO,X
00504 F9D1 A7 00              STA A   0,X      MOVE CHAR
00505                 *
00506 F9D3 30                 TSX
00507 F9D4 81 04              CMP A   #4       DONE?
00508 F9D6 27 0E              BEQ     MOVS3    ;YES
00509                 *
00510 F9D8 6C 0A              INC     FROM+1,X
00511 F9DA 26 02              BNE     MOVS2
00512                 *
00513 F9DC 6C 09              INC     FROM,X
00514                 *
00515 F9DE 6C 0C      MOVS2   INC     TOO+1,X
00516 F9E0 26 E8              BNE     MOVS1
00517                 *
00518 F9E2 6C 0B              INC     TOO,X
00519 F9E4 20 E4              BRA     MOVS1
00520                 *
00521 F9E6 39         MOVS3   RTS
00522                 *************************************
00523                 * DISPATCH TABLE FOR PROCESSING ROUTINES
00524                 *
00525      01AD       DSPTAB EQU     *-STRT
00526                 *
00527 F9E7 FE7C               FDB     *-PSHAL*$FFFF    0
00528 F9E9 FE96               FDB     *-PULAL*$FFFF    1
00529 F9EB FEAF               FDB     *-TXAB*$FFFF     2
00530 F9ED FEB7               FDB     *-TABX*$FFFF     3
00531 F9EF FEBF               FDB     *-XABX*$FFFF     4
00532 F9F1 FEC8               FDB     *-PSHX*$FFFF     5
00533 F9F3 FEDD               FDB     *-PULX*$FFFF     6
00534 F9F5 FEF1               FDB     *-ADXAB*$FFFF    7
00535 F9F7 FEF6               FDB     *-ADABX*$FFFF    8
00536 F9F9 FF0B               FDB     *-ADDAX*$FFFF    9
00537 F9FB FF10               FDB     *-ADDBX*$FFFF    10
00538 F9FD FF13               FDB     *-SBXAB*$FFFF    11
00539 F9FF FF18               FDB     *-SBABX*$FFFF    12
```

```
00540 FA01 FF23              FDB     *-SUBAX*$FFFF  13
00541 FA03 FF2F              FDB     *-SUBBX*$FFFF  14
00542 FA05 FF3A              FDB     *-MUL8*$FFFF   15
00543 FA07 FF43              FDB     *-MUL16*$FFFF  16
00544 FA09 FF7C              FDB     *-MOVC*$FFFF   17
00545 FA0B FF99              FDB     *-CMPC*$FFFF   18
00546 FA0D FFBC              FDB     *-MOVS*$FFFF   19
00547 FA0F FF28              FDB     *-INDEX*$FFFF  20
00548               ************************************
00549               *
00550               * START OF THE MONITOR PART
00551               *
00552 FA11 FE F100 IO     LDX    IOV      LOAD IRQ RAM VECTOR
00553 FA14 6E 00          JMP    X        GOTO IT
00554               *
00555 FA16 FE F102 POWDWN LDX    NIO      LOAD NMI RAM VECTOR
00556 FA19 6E 00          JMP    X        GOTO IT
00557               *
00558 FA1B 86 11   RDRON  LDA A  #$11     DC1 CODE
00559 FA1D BD FA7F        JSR    OUTCH
00560 FA20 B6 F11B NOECHO LDA A  STATUS   SET NOECHO BIT
00561 FA23 8A 80          ORA A  #$80
00562 FA25 7E FC10        JMP    ECHO1
00563               ************************************
00564               * LOAD OBJECT FILE
00565               *
00566 FA28 8D F1   LOAD   BSR    RDRON    PUT READER ON
00567 FA2A BD FA82 LOAD3  JSR    INCH     LOOK FOR HEADER
00568 FA2D 81 53          CMP A  #'S
00569 FA2F 26 F9          BNE    LOAD3    NOT FOUND
00570 FA31 BD FA82        JSR    INCH
00571 FA34 81 30          CMP A  #'0      SEARCH HEADER
00572 FA36 26 F2          BNE    LOAD3    STILL NOT FOUND
00573               *            BRa    Load4
00574 FA38 86 07   Load3  LDA A  #$7      FOUND HEADER Bell
00575 FA3A BD FA7F        JSR    OUTCH    +8
00576               *************
00577 FA3D 8D 43   LOAD4  BSR    INCH     START LOAD DATA BLOCK
00578 FA3F 81 53          CMP A  #'S
00579 FA41 26 FA          BNE    LOAD4
00580 FA43 8D 3D          BSR    INCH
00581 FA45 81 39          CMP A  #'9      END RECORD?
00582 FA47 27 25          BEQ    LOAD21   YES
00583 FA49 81 31          CMP A  #'1
00584 FA4B 26 F0          BNE    LOAD4
00585               *            BEQ    Load3
00586 FA4D 7F F116        CLR    CKSM
00587 FA50 8D 41          BSR    BYTE     GET BYTE COUNT
00588 FA52 80 02          SUB A  #2       ADJUST IT
00589 FA54 B7 F118        STA A  BYTEC1   SAVE IT
00590 FA57 8D 2C          BSR    BADDR    GET FIRST LOC
00591 FA59 8D 38   LOAD11 BSR    BYTE     GET THE DATA
00592 FA5B 7A F118        DEC    BYTEC1   DECREMENT COUNT
00593 FA5E 27 05          BEQ    LOAD15   GO CHECK THE BLOCK
```

*handwritten marginalia: FDB x - RTS*8...*, *cro A #'0 BEQ Load3*, *+8*

```
00594 FA60 A7 00           STA  A   X          SAVE DATA
00595 FA62 08              INX                  BUMP POINTER
00596 FA63 20 F4           BRA      LOAD11      END CONTINUE
00597                  *
00598 FA65 7C F116 LOAD15 INC      CKSM        CORRECT LOADED?
00599 FA68 27 D3           BEQ      LOAD4       YES
00600                  *
00601 FA6A 86 3F   OUTQM   LDA  A   #'?         OUTPUT QUESTIONMARK
00602 FA6C 8D 11           BSR      OUTCH
00603                  *
00604      FA6E    LOAD21  EQU      *
00605 FA6E 7E FB56 C1      JMP      CONTRL      GOTO MONITOR
00606                  *************************************
00607                  *
00608 FA71 44      OUTHL   LSR  A
00609 FA72 44              LSR  A
00610 FA73 44              LSR  A
00611 FA74 44              LSR  A
00612 FA75 84 0F   OUTHR   AND  A   #$F         MASK OFF BITS
00613 FA77 8B 30           ADD  A   #$30        MAKE ASCII
00614 FA79 81 39           CMP  A   #$39        NUMBERS?
00615 FA7B 23 02           BLS      OUTCH       AND RTS
00616 FA7D 8B 07           ADD  A   #7
00617                  *************************************
00618                  *
00619 FA7F 7E FD0D OUTCH   JMP      OUTEE       STEPPING STONE
00620 FA82 7E FD24 INCH    JMP      INEEE       TOO
00621                  *************************************
00622                  *
00623 FA85 8D 0C   BADDR   BSR      BYTE        CONVERT 2 BYTES INTO ADDRESS
00624 FA87 B7 F114         STA  A   XHI
00625 FA8A 8D 07           BSR      BYTE
00626 FA8C B7 F115         STA  A   XLO
00627 FA8F FE F114 BADR1   LDX      XHI         ADDRESS WE BUILT
00628 FA92 39              RTS
00629                  *************************************
00630                  *
00631 FA93 8D 53   BYTE    BSR      INHEX       CONVERTS 2 HEX CHAR INTO BYTE
00632 FA95 48              ASL  A
00633 FA96 48              ASL  A
00634 FA97 48              ASL  A
00635 FA98 48              ASL  A               SHIFT 4 PLACES TO THE LEFT
00636 FA99 16              TAB
00637 FA9A 8D 4C           BSR      INHEX
00638 FA9C 1B              ABA                  COMBINE CHAR
00639 FA9D 16              TAB
00640 FA9E FB F116         ADD  B   CKSM        UPDATE CHECKSUM
00641 FAA1 F7 F116         STA  B   CKSM
00642 FAA4 39              RTS
00643                  *************************************
00644                  *
00645 FAA5 CE FF98 OUTSTG  LDX      #MCL1       CRLF STRING
00646 FAA8 20 03           BRA      PDATA1      OUTPUT IT
00647                  *
```

```
00648 FAAA 8D D3    PDATA2 BSR      OUTCH
00649 FAAC 08              INX
00650 FAAD A6 00    PDATA1 LDA A    X          GET A CHAR
00651 FAAF 81 04           CMP A    #4         END OF STRING?
00652 FAB1 26 F7           BNE      PDATA2     NOT YET
00653 FAB3 39              RTS
00654               ****************************************
00655               *
00656 FAB4 8D CF    CHANGE BSR      BADDR      GET ADDRESS OF LOC
00657 FAB6 8D 5C           BSR      OUTS
00658 FAB8 8D 4B    CHA1   BSR      OUT2H      OUTPUT CONTENTS
00659 FABA 8D C6           BSR      INCH       GET COMMAND
00660 FABC 81 0D           CMP A    #$D        TERMINATE?
00661 FABE 27 AE           BEQ      C1         YES
00662 FAC0 81 5E           CMP A    #'↑
00663 FAC2 27 20           BEQ      CHA11      PREVIOUS LOC
00664 FAC4 81 20           CMP A    #$20
00665 FAC6 26 0D           BNE      CHA12      NO CHANGE OF DATA
00666 FAC8 8D C9           BSR      BYTE       NEW DATA
00667 FACA 09              DEX                 ADJUST POINTER
00668 FACB A7 00           STA A    X          STORE DATA
00669 FACD A1 00           CMP A    X          DATA CORRECT WRITTEN?
00670 FACF 27 03           BEQ      CHA14      YES
00671 FAD1 7E FA6A C3      JMP      OUTQM      GO OUTPUT '?'
00672 FAD4 08      CHA14   INX
00673 FAD5 FF F114 CHA12   STX      XHI        SAVE POINTER FOR A WHILE
00674 FAD8 8D CB           BSR      OUTSTG
00675 FADA CE F114         LDX      #XHI       OUTPUT NEW ADDRESS
00676 FADD 8D 31           BSR      OUT4HS
00677 FADF FE F114         LDX      XHI        GET POINTER
00678 FAE2 20 D4           BRA      CHA1
00679 FAE4 09      CHA11   DEX                 DECREMENT
00680 FAE5 09              DEX
00681 FAE6 20 ED           BRA      CHA12
00682               *****************************************
00683               *
00684 FAE8 8D 98    INHEX  BSR      INCH
00685 FAEA 80 30           SUB A    #$30       LOWER AS '0'
00686 FAEC 2B 0F           BMI      ERROR      NO HEX
00687 FAEE 81 09           CMP A    #$09
00688 FAF0 2F 0A           BLE      IN1HG      HEX
00689 FAF2 81 11           CMP A    #$11
00690 FAF4 2B 07           BMI      ERROR      NO HEX
00691 FAF6 81 16           CMP A    #$16
00692 FAF8 2E 03           BGT      ERROR      NO HEX
00693 FAFA 80 07           SUB A    #7         ADJUST
00694 FAFC 39      IN1HG   RTS
00695               ***************
00696 FAFD FF F11F  ERROR  STX      ERSAVE     SAVE X
00697 FB00 FE F11D         LDX      ERRVEC     GET ERROR ROUTINE
00698 FB03 6E 00           JMP      X          GOTO IT
00699               *
00700               *****************************************
00701                      /*
```

```
00702 FB05 A6 00   OUT2H  LDA A  X              GET A CHAR
00703 FB07 BD FA71 OUT2HA JSR    OUTHL          OUTPUT LEFT CHAR
00704 FB0A A6 00          LDA A  X
00705 FB0C 08             INX
00706 FB0D 7E FA75        JMP    OUTHR          OUTPUT RIGHT CHAR +RTS
00707              ************************************
00708              *
00709 FB10 8D F3   OUT4HS BSR    OUT2H          OUTPUT LEFT 2HEX
00710 FB12 8D F1   OUT2HS BSR    OUT2H          OUTPUT RIGHT 2HEX
00711 FB14 86 20   OUTS   LDA A  #$20           SPACE CHAR
00712 FB16 7E FA7F        JMP    OUTCH          +RTS
00713              ************************************
00714              *
00715              * RESTART ENTRY
00716              *
00717              * ACIA1=CONSOLE DEVICE
00718              *
00719              * ALL INTERRUPT POINTERS SET
00720              *
00721       FB19   START  EQU    *
00722 FB19 8E F1B4        LDS    #TSTACK        SETUP USER STACKPOINTER
00723 FB1C BF F112        STS    TSP
00724              *
00725 FB1F CE FBD5        LDX    #SFE           SETUP INTERRUPT POINTERS
00726 FB22 FF F104        STX    SWIVEC         SOFTWARE INTERRUPT
00727 FB25 FF F102        STX    NIO            NON MASKABLE INT
00728 FB28 FF F100        STX    IOV            INTERRUPT REQUEST
00729              *
00730 FB2B 86 03          LDA A  #3
00731 FB2D B7 F002        STA A  ACIA2          RESET TTY DEVICE
00732 FB30 B7 F000        STA A  ACIA           RESET CONSOLE DEVICE
00733 FB33 7F F11B        CLR    STATUS         ECHO ON
00734              *
00735 FB36 86 11          LDA A  #$11           CONTROL WORD FOR ACIA
00736 FB38 B7 F000        STA A  ACIA           WRITE CONSOLE DEVICE
00737 FB3B B7 F002        STA A  ACIA2          WRITE TTY DEVICE
00738              *
00739 FB3E CE FD41        LDX    #INCR          SETUP INDIRECT FOR INPUT
00740 FB41 FF F108        STX    INSWTC
00741 FB44 CE FD15        LDX    #OTCR
00742 FB47 FF F10A        STX    OTSWTC
00743              *
00744 FB4A CE FA6A ERRSET LDX    #OUTQM         SET TO  OUT'?'
00745 FB4D FF F11D        STX    ERRVEC
00746              *
00748 FB50 CE F000 SETDEV LDX    #ACIA          SET DEVICE VECTOR CONSOLE
00749 FB53 FF F106        STX    ACIAVC
00750              *
00751 FB56 8E F1F0 CONTRL LDS    #CSTACK        GET MONITOR STACKPOINTER
00752 FB59 BD FC07        JSR    RDROFF
00753 FB5C BD FC02        JSR    PNHOFF         TURN READER AND PUNCH OFF
00754              *
00755 FB5F CE FF90        LDX    #MCL0          OUTPUT MONITOR PROMPT
00756 FB62 BD FAAD        JSR    PDATA1
```

```
00757                          *
00758 FB65 BD FD06             JSR     INCMD      GET COMMAND
00759 FB68 16                  TAB
00760 FB69 8D A9               BSR     OUTS       OUTPUT SPACE
00761                          *
00762 FB6B C1 50               CMP  B  #'P        PRINT OR PUNCH?
00763 FB6D 27 57               BEQ     CL1
00764                          *
00765 FB6F C1 4C               CMP  B  #'L        LOAD FILE
00766 FB71 26 03               BNE     *+5
00767 FB73 7E FA28             JMP     LOAD
00768                          *
00769 FB76 C1 4D               CMP  B  #'M        MEMORY EXAMIN OR CHANGE
00770 FB78 26 03               BNE     *+5
00771 FB7A 7E FAB4             JMP     CHANGE
00772                          *
00773 FB7D C1 54               CMP  B  #'T        TRACE MODE?
00774 FB7F 26 03               BNE     *+5
00775 FB81 7E FD97             JMP     TRACE
00776                          *
00777 FB84 C1 4F               CMP  B  #'O        OFFSET
00778 FB86 26 03               BNE     *+5
00779 FB88 7E FD62             JMP     OFFSET
00780                          *
00781 FB8B C1 44               CMP  B  #'D        DEVICE SELECT
00782 FB8D 26 0A               BNE     CL10
00783 FB8F BD FAE8             JSR     INHEX      GET DEVICE
00784 FB92 27 05        4A     BEQ     CL10       SKIP ZERO
00785 FB94 4A           2B03   DEC  A
00786 FB95 48           48     ASL  A
00787 FB96 B7 F107             STA  A  ACIAVC+1
00788                          *
00789 FB99 C1 52       CL10    CMP  B  #'R        PRINT REGISTERS?
00790 FB9B 27 44               BEQ     PRNTRG
00791                          *
00792 FB9D C1 47               CMP  B  #'G        GOTO PROGRAM?
00793 FB9F 26 B5               BNE     CONTRL     NO VALID COMMAND
00794                          *
00795 FBA1 BD FA82             JSR     INCH
00796 FBA4 81 0D               CMP  A  #$0D       CONTINUE?
00797 FBA6 27 17               BEQ     CONTIN
00798                          *
00799 FBA8 BD FAEA             JSR     INHEX+2
00800 FBAB BD FA95             JSR     BYTE+2
00801 FBAE BD FA87             JSR     BADDR+2    GET START ADDRESS
00802 FBB1 CE F114             LDX     #XHI
00803 FBB4 A6 00               LDA  A  X          GET ADDRESS IN A,B
00804 FBB6 E6 01               LDA  B  1,X
00805 FBB8 FE F112             LDX     TSP        MODIFY RETURN ADDRESS ON STAC
00806 FBBB A7 06               STA  A  6,X
00807 FBBD E7 07               STA  B  7,X
00808                          *
00809 FBBF BF F112     CONTIN  LDS     TSP        RESTORE USER STACKPOINTER
00810 FBC2 73 F004             COM     TRACAD     TRIGGER HARDWARE TRACE
```

```
00811 FBC5 3B              RTI              AND RUN
00812                      ****************************************
00813 FBC6 8D 37   CL1     BSR     INCH1    GET SUB COMMAND
00814 FBC8 81 48           CMP A   #'H      PUNCH?
00815 FBCA 27 48           BEQ     PUNCH
00816 FBCC 81 54           CMP A   #'T      PRINT
00817 FBCE 26 03           BNE     *+5      NOT VALID
00818 FBD0 7E FCB5         JMP     PRINT
00819 FBD3 20 81           BRA     CONTRL
00820                      ****************************************
00821                      *
00822       FBD5   SFE     EQU     *
00823 FBD5 BF F112         STS     TSP      SAVE USER STACKPOINTER
00824 FBD8 30              TSX
00825 FBD9 6D 06           TST     6,X      DECREMENT 'PC'
00826 FBDB 26 02           BNE     *+4
00827 FBDD 6A 05           DEC     5,X
00828 FBDF 6A 06           DEC     6,X
00829                      *       LDS     #cstack   give anyhow a stack
00830 FBE1 8D 03   PRNTRG  BSR     PRTREG   PRINT USER REGISTERS
00831 FBE3 7E FB56 C4      JMP     CONTRL
00832                      *
00833 FBE6 FE F112 PRTREG  LDX     TSP
00834 FBE9 08              INX
00835 FBEA BD FB12         JSR     OUT2HS   OUTPUT 'CC'
00836 FBED BD FB12         JSR     OUT2HS   OUTPUT 'B'
00837 FBF0 BD FB12         JSR     OUT2HS   OUTPUT 'A'
00838 FBF3 BD FB10         JSR     OUT4HS   OUTPUT 'X'
00839 FBF6 BD FB10         JSR     OUT4HS   OUTPUT 'PC'
00840 FBF9 CE F112         LDX     #TSP
00841 FBFC 7E FB10         JMP     OUT4HS   OUTPUT 'SP'  +RTS
00842                      ****************************************
00843                      *
00844 FBFF 7E FD24 INCH1   JMP     INEEE    STEPPING STONE
00845                      *
00846 FC02 86 14   PNHOFF  LDA A   #$14     DC4
00847 FC04 7E FD0D OUTCH1  JMP     OUTEE    +RTS
00848                      *
00849 FC07 86 13   RDROFF  LDA A   #$13     DC3
00850 FC09 8D F9           BSR     OUTCH1
00851 FC0B B6 F11B ECHO    LDA A   STATUS
00852 FC0E 84 7F           AND A   #$7F     CLEAR BIT
00853 FC10 B7 F11B ECHO1   STA A   STATUS
00854 FC13 39              RTS
00855                      ****************************************
00856                      *
00857       FC14   PUNCH   EQU     *
00858 FC14 8D 6C           BSR     SADDR    VERIFY BEGA AND ENDA
00859 FC16 CE FFC2         LDX     #MTAPE4  X= STRING
00860 FC19 BD FAAD         JSR     PDATA1
00861 FC1C BD FA82         JSR     INCH     WAIT
00862 FC1F BD FD4D         JSR     PNHTRL   GO PUNCH LEADER
00863                      *
00864 FC22 FE F10C PUN35   LDX     BEGA
```

```
00865 FC25 FF F110      STX    TW
00866 FC28 B6 F10F PUN11 LDA A  ENDA+1
00867 FC2B B0 F111      SUB A  TW+1
00868 FC2E F6 F10E      LDA B  ENDA
00869 FC31 F2 F110      SBC B  TW
00870 FC34 26 04        BNE    PUN22      DIFF >16
00871 FC36 81 10        CMP A  #16
00872 FC38 25 02        BCS    PUN23
00873                *
00874 FC3A 86 0F   PUN22 LDA A  #15
00875 FC3C 8B 04   PUN23 ADD A  #4
00876 FC3E B7 F11A      STA A  MCONT
00877 FC41 80 03        SUB A  #3
00878 FC43 B7 F117      STA A  TEMP1      BYTE COUNT
00879 FC46 CE FFB1      LDX    #MTAPE1    DATA STRING
00880 FC49 8D 02        BSR    PUN40      PUNCH DATA STRING
00881 FC4B 20 24        BRA    PUN50
00882                *
00883 FC4D BD FAAD PUN40 JSR    PDATA1
00884 FC50 5F          CLR B             CLEAR CHECKSUM
00885 FC51 CE F11A      LDX    #MCONT     FRAME COUNT
00886 FC54 8D 27        BSR    PUNT2
00887 FC56 CE F110      LDX    #TW        OUTPUT ADDRESS
00888 FC59 8D 22        BSR    PUNT2
00889 FC5B 8D 20        BSR    PUNT2
00890 FC5D FE F110      LDX    TW         DATA POINTER
00891 FC60 8D 1B   PUN32 BSR    PUNT2
00892 FC62 7A F117      DEC    TEMP1      DECR.BYTE COUNT
00893 FC65 26 F9        BNE    PUN32      LOOP UNTIL DONE
00894 FC67 FF F110      STX    TW         SAVE POINTER
00895 FC6A 53          COM B             MAKE 1'S COMPLEMENT
00896 FC6B 37          PSH B
00897 FC6C 30          TSX
00898 FC6D 8D 0E        BSR    PUNT2
00899 FC6F 33          PUL B             RESTORE STACK
00900 FC70 39          RTS
00901                *
00902 FC71 FE F110 PUN50 LDX    TW
00903 FC74 09          DEX
00904 FC75 BC F10E      CPX    ENDA       FINISHED?
00905 FC78 26 AE        BNE    PUN11
00906 FC7A 7E FD57      JMP    PNCHTR     PUNCH TRAILER
00907                *
00908 FC7D EB 00   PUNT2 ADD B  X         UPDATE CHECKSUM
00909 FC7F 7E FB05      JMP    OUT2H      PUNCH 2HEX  +RTS
00910           ********************************************
00911                *
00912 FC82 CE FF9D SADDR LDX    #STRG1     BEGA STRING
00913 FC85 BD FAAD      JSR    PDATA1
00914 FC88 CE F10C      LDX    #BEGA      PRINT OLD
00915 FC8B BD FB10      JSR    OUT4HS
00916 FC8E BD FD24      JSR    INEEE      ALTER?
00917 FC91 81 20        CMP A  #$20
00918 FC93 26 06        BNE    *+8
```

```
00919 FC95 BD FA85              JSR    BADDR    GET NEW
00920 FC98 FF F10C              STX    BEGA     STORE IT
00921 FC9B CE FFA7              LDX    #STRG2   ENDA STRING
00922 FC9E BD FAAD              JSR    PDATA1
00923 FCA1 CE F10E              LDX    #ENDA
00924 FCA4 BD FB10              JSR    OUT4HS   PRINT OLD
00925 FCA7 BD FD24              JSR    INEEE    ALTER?
00926 FCAA 81 20               CMP A   #$20
00927 FCAC 26 06                BNE    *+8
00928 FCAE BD FA85              JSR    BADDR    GET NEW
00929 FCB1 FF F10E              STX    ENDA     SAVE IT
00930 FCB4 39                   RTS
00931·               ***************************************
00932               *
00933 FCB5 8D CB     PRINT BSR   SADDR    FROM TOO
00934 FCB7 FE F10C         LDX    BEGA
00935 FCBA FF F110         STX    TW
00936 FCBD BD FAA5         JSR    OUTSTG   OUTPUT CRLF
00937 FCC0 CE F110         LDX    #TW
00938 FCC3 BD FB10         JSR    OUT4HS   OUTPUT ADDRESS ON EACH LINE
00939 FCC6 FE F110         LDX    TW       DATA POINTER
00940 FCC9 C6 10          LDA B  #16      BYTE COUNT
00941 FCCB A6 00     PRT1 LDA A  X        GET DATA
00942 FCCD BD FB12         JSR    OUT2HS   OUTPUT BYTE
00943 FCD0 5A              DEC B           UNTIL
00944 FCD1 26 F8           BNE    PRT1     DONE
00945 FCD3 FE F110         LDX    TW
00946 FCD6 C6 10          LDA B  #16
00947 FCD8 A6 00     PRT2 LDA A  X
00948 FCDA 8D 1C          BSR    SELCAR   SAME IN ASCII
00949 FCDC 08              INX
00950 FCDD 5A              DEC B
00951 FCDE 26 F8           BNE    PRT2
00952 FCE0 FF F110         STX    TW       CHECK DONE
00953 FCE3 B6 F10F         LDA A  ENDA+1
00954 FCE6 B0 F111         SUB A  TW+1
00955 FCE9 F6 F10E         LDA B  ENDA
00956 FCEC F2 F110         SBC B  TW
00957 FCEF 24 CC           BCC    PRINT+8  NOT YET
00958 FCF1 81 00          CMP A   #0
00959 FCF3 2C C8           BGE    PRINT+8  NOT YET
00960 FCF5 7E FB56         JMP    CONTRL   READY
00961               ***************************************
00962               *
00963 FCF8 81 20     SELCAR CMP A #$20     ,< SPACE?
00964 FCFA 25 06           BCS    PRT3
00965 FCFC 81 60          CMP A   #$60     >  '\'
00966 FCFE 24 02           BCC    PRT3
00967 FD00 20 02           BRA    PRT4
00968               *
00969 FD02 86 2E     PRT3 LDA A  #'.      CONVERT CHAR
00970 FD04 20 07     PRT4 BRA    OUTEE    +RTS
00971               ***************************************
00972               *
```

```
00973 FD06 8D 1C    INCMD  BSR   INEEE   CHAR @-\    ?
00974 FD08 85 40           BIT A #$40
00975 FD0A 27 FA           BEQ   INCMD   NOT YET
00976 FD0C 39              RTS
00977                      *****************************************
00978                      *
00979 FD0D 37       OUTEE  PSH B         SAVE B
00980 FD0E 3F              FCB   $3F,05  PSHX
00981                      *
00982 FD10 FE F10A         LDX   OTSWTC  GET SWITCH VECTOR
00983 FD13 6E 00           JMP   X
00984                      *
00985 FD15 FE F106  OTCR   LDX   ACIAVC  GET DEVICE VECTOR
00986 FD18 E6 00     OT1   LDA B X       TRANSMITTER EMPTY?
00987 FD1A 57              ASR B
00988 FD1B 57              ASR B
00989 FD1C 24 FA           BCC   OT1
00990 FD1E A7 01           STA A 1,X     WRITE DATA
00991                      *
00992 FD20 3F       RET2   FCB   $3F,06  PULX
00993 FD22 33              PUL B
00994 FD23 39       RET1   RTS
00995                      *****************************************
00996                      *
00997 FD24 8D 13     INEEE BSR   INPUT
00998 FD26 84 7F           AND A #$7F    STRIP PARITY
00999 FD28 81 7F           CMP A #$7F    RUBOUT?
01000 FD2A 27 F8           BEQ   INEEE
01001 FD2C 81 60           CMP A #$60    CAPTST
01002 FD2E 23 02           BLS   *+4
01003 FD30 84 5F           AND A #$5F    CONVERT TO CAPS
01004 FD32 7D F11B         TST   STATUS  ECHO?
01005 FD35 2B EC           BMI   RET1    NO
01006 FD37 20 D4           BRA   OUTEE   GO ECHO
01007                      *
01008 FD39 37       INPUT  PSH B
01009 FD3A 3F              FCB   $3F,05  PSHX
01010 FD3C FE F108         LDX   INSWTC  GET SWITCH VECTOR
01011 FD3F 6E 00           JMP   X
01012                      *
01013 FD41 FE F106  INCR   LDX   ACIAVC  GET DEVICE VECTOR
01014 FD44 E6 00     IN1   LDA B X       RECEIVER FULL?
01015 FD46 57              ASR B
01016 FD47 24 FB           BCC   IN1
01017 FD49 A6 01           LDA A 1,X     GET DATA
01018                      *
01019 FD4B 20 D3           BRA   RET2
01020                      *****************************************
01021                      *
01022 FD4D C6 32    PNHTRL LDA B #50     PUNCH 10 INCHES BLANK TAPE
01023 FD4F 4F              CLR A
01024 FD50 BD FA7F  FL1    JSR   OUTCH   PUNCH
01025 FD53 5A              DEC B
01026 FD54 26 FA           BNE   FL1
```

```
01027 FD56 39              RTS
01028                *
01029 FD57 CE FFB9 PNCHTR LDX     #MTAPE3   TRAILER STRING
01030 FD5A BD FAAD         JSR     PDATA1
01031 FD5D 8D EE           BSR     PNHTRL
01032                *
01033 FD5F 7E FB56 C5      JMP     CONTRL
01034                **************************************
01035                *
01036 FD62 BD FC82 OFFSET JSR     SADDR     FROM-TOO
01037 FD65 BD FAA5         JSR     OUTSTG
01038 FD68 FE F10C         LDX     BEGA      GET FROM
01039 FD6B 08              INX
01040 FD6C 08              INX
01041 FD6D FF F110         STX     TW
01042 FD70 4F              CLR A             COUNTER
01043 FD71 BC F10E OF1L    CPX     ENDA      DONE?
01044 FD74 27 19           BEQ     OFFFIN
01045 FD76 08              INX
01046 FD77 4C              INC A
01047 FD78 2A F7           BPL     OF1L
01048 FD7A 4F              CLR A
01049 FD7B FE F110         LDX     TW
01050 FD7E BC F10E OF2L    CPX     ENDA
01051 FD81 27 0C           BEQ     OFFFIN    DONE
01052 FD83 09              DEX
01053 FD84 4A              DEC A
01054 FD85 2B F7           BMI     OF2L
01055                *
01056 FD87 CE FFE4         LDX     #INVLD    NOT VALID MESS
01057 FD8A BD FAAD         JSR     PDATA1
01058 FD8D 20 D0           BRA     C5        GOTO MONITOR
01059                *
01060 FD8F 36       OFFFIN PSH A
01061 FD90 30              TSX
01062 FD91 BD FB05         JSR     OUT2H
01063 FD94 32              PUL A             RESTORE STACK
01064 FD95 20 C8           BRA     C5
01065                **************************************
01066                *
01067      FD97     TRACE  EQU     *
01068 FD97 86 2D           LDA A   #'-       PROMPT
01069 FD99 BD FA7F         JSR     OUTCH
01070 FD9C BD FD06         JSR     INCMD     GET COMMAND
01071 FD9F 81 52           CMP A   #'R       RESET TRACE?
01072 FDA1 26 05           BNE     *+7
01073 FDA3 7F F004         CLR     TRACAD    LOCK COUNTER
01074 FDA6 20 B7           BRA     C5        GOTO MONITOR
01075                *
01076 FDA8 81 43           CMP A   #'C       ONE INSTRUCTION?
01077 FDAA 27 1D           BEQ     TRACE1
01078                *
01079 FDAC 81 53           CMP A   #'S       MULTIPLE INSTR. ?
01080 FDAE 26 E5           BNE     *-25
```

```
01081 FDB0 BD FA93         JSR     BYTE      GET INSTR. COUNT
01082 FDB3 B7 F11C         STA A   TRSCNT    SAVE IT
01083 FDB6 20 06           BRA     *+8
01084               ****************
01085 FDB8 BF F112 TRACYC  STS     TSP       ENTRY  ON TRACE
01086 FDBB BD FAA5         JSR     OUTSTG    OUTPUT CRLF
01087 FDBE BD FBE6         JSR     PRTREG    PRINT REGISTERS
01088 FDC1 7D F11C         TST     TRSCNT    DONE?
01089 FDC4 27 D1           BEQ     TRACE
01090 FDC6 7A F11C         DEC     TRSCNT    NEXT INSTR.
01091 FDC9 CE FDB8 TRACE1  LDX     #TRACYC   SET NMI VECTOR
01092 FDCC FF F102         STX     NIO
01093 FDCF 7C F004         INC     TRACAD    UNLOCK COUNTER
01094 FDD2 7E FBBF         JMP     CONTIN    AND GO
01095               *********************************
01096               *
01097               *
01098               * DISCIO SOFTWARE
01099               *
01100               * CALLING SEQUENCE LDX CHANNELTBL ADDR
01101               *
01102               * JSR DISCIO
01103               *
01112      000E     CTBSH   EQU     14        BEGINNING SECTOR HIGH
01113      000F     CTBSL   EQU     15        ,,         ,,   LOW
01114      0010     CTLSH   EQU     16        LAST SECTOR OPTD. ON HIGH
01115      0011     CTLSL   EQU     17        ,,      ,,    ,,   ,, LOW
01116      0012     CTBPH   EQU     18        BUFFER POINTER HIGH
01117      0013     CTBPL   EQU     19        ,,       ,,   LOW
01118      0014     CTDC    EQU     20        DISC I/O COMMAND
01119      0015     CTDR    EQU     21        DRIVE # (HEAD)
01120      0016     CTNSH   EQU     22        NEXT SECTOR HIGH
01121      0017     CTNSL   EQU     23        ,,      ,,   LOW
01122      0018     CTBAH   EQU     24        BUFFER ADDRESS HIGH
01123      0019     CTBAL   EQU     25        ,,        ,,  LOW
01124      001A     CTST    EQU     26        DISC I/O STATUS
01125               *
01126      6800     FORMAD  EQU     $6800     FORMATTER ADDRESS
01127      6801     DRIVAD  EQU     $6801     DRIVE ADDRESS
01128      6000     RWFIFO  EQU     $6000     READ / WRITE FIFO
01129               *
01130      0080     CONSEL  EQU     $80       CONTOL SELECT
01131      0040     DIFSEL  EQU     $40       DIFFERENCE SELECT
01132      0020     HEDSEL  EQU     $20       HEAD SELECT
01133      0004     RDCMD   EQU     $04 02    READ COMMAND DRIVE
01134      0011     WTCMD   EQU     $11       WRITE COMMAND DRIVE
01135      0040     RTHS    EQU     $40       RETURN HOME SEEK DRIVE
01136      0003     READC   EQU     $03       FORMATTER READ COMM
01137      0002     WRITC   EQU     $02       FORMATTER WRITE COMM
01138      0004     FWDSK   EQU     $04       FORWARD SEEK DRIVE
01139      0020     RVSSK   EQU     $20       REVERSE SEEK DRIVE
01140               *
01141      FDD5     DISCIO  EQU     *
01142 FDD5 37               PSH B
01143 FDD6 3F               FCB     $3F,05    PSHX
01144 FDD8 A6 14            LDA A   CTDC,X    GET COMMAND
01145 FDDA 81 02            CMP A   #2 RDCMD  VALID COMMAND?
```

```
00001                          NAM    KEEBUG2
00002                          OPT    O,S,NOG
00003              *
00004              *
00005              * BY C.SCHOENMAKERS DATE 79 04 28
****ERROR 210
00098 F83F CB AD              ADDB   #DSPTAB
01097                          OPT    L
01098              *
01099              *
01100              * DISCIO SOFTWARE
01101              *
01102              * CALLING SEQUENCE LDX CHANNELTBL ADDR
01103              *
01104              * JSR DISCIO
01105              *
01106              * CHANNEL TABLEDEFINITIONS
01107       0000   CTCTH  EQU    0          CHANNEL TABLE ADDRESS HIGH
01108       0001   CTCTL  EQU    1          ,,      ,,      ,,     LOW
01109       0002   CTN1   EQU    2          NAME
01110       000A   CTM1   EQU    10         MODIFIER
01111       000D   CTFG   EQU    13         FLAGS
01112       000E   CTBSH  EQU    14         BEGINNING SECTOR HIGH
01113       000F   CTBSL  EQU    15         ,,           ,,   LOW
01114       0010   CTLSH  EQU    16         LAST SECTOR OPTD. ON HIGH
01115       0011   CTLSL  EQU    17         ,,      ,,      ,,    ,, LOW
01116       0012   CTBPH  EQU    18         BUFFER POINTER HIGH
01117       0013   CTBPL  EQU    19         ,,         ,,    LOW
01118       0014   CTDC   EQU    20         DISC I/O COMMAND
01119       0015   CTDR   EQU    21         DRIVE # (HEAD)
01120       0016   CTNSH  EQU    22         NEXT SECTOR HIGH
01121       0017   CTNSL  EQU    23         ,,     ,,   LOW
01122       0018   CTBAH  EQU    24         BUFFER ADDRESS HIGH
01123       0019   CTBAL  EQU    25         ,,          ,,    LOW
01124       001A   CTST   EQU    26         DISC I/O STATUS
01125              *
01126       6800   FORMAD EQU    $6800      FORMATTER ADDRESS
01127       6801   DRIVAD EQU    $6801      DRIVE ADDRESS
01128       6000   RWFIFO EQU    $6000      READ / WRITE FIFO
01129              *
01130       0080   CONSEL EQU    $80        CONTOL SELECT
01131       0040   DIFSEL EQU    $40        DIFFERENCE SELECT
01132       0020   HEDSEL EQU    $20        HEAD SELECT
01133       0004   RDCMD  EQU    $04 02     READ COMMAND DRIVE
01134       0011   WTCMD  EQU    $11        WRITE COMMAND DRIVE
01135       0040   RTHS   EQU    $40        RETURN HOME SEEK DRIVE
01136       0003   READC  EQU    $03        FORMATTER READ COMM
01137       0002   WRITC  EQU    $02        FORMATTER WRITE COMM
01138       0004   FWDSK  EQU    $04        FORWARD SEEK DRIVE
01139       0020   RVSSK  EQU    $20        REVERSE SEEK DRIVE
01140              *
01141       FDD5   DISCIO EQU    *
01142 FDD5 37            PSH B
01143 FDD6 3F            FCB    $3F,05      PSHX
01144 FDD8 A6 14         LDA A  CTDC,X      GET COMMAND
01145 FDDA 81 02         CMP A  #2 RdCmd    VALID COMMAND?
```

```
01146 FDDC 23 08            BLS     DISC1
01147 FDDE C6 01            LDA B   #1        SET STATUS ERROR 1        βπτα
01148 FDE0 3F      DISRET FCB       $3F,06    PULX                     pulb
01149 FDE2 E7 1A   DSCERRT STA B    CTST,X    SET RETURN STATUS        RTS  ∅
01150 FDE4 33               PUL B
01151 FDE5 39               RTS
01152                *
01153 FDE6 4D      DISC1  TST A               RESET?
01154 FDE7 26 43            BNE     DISC2     NO
01155 FDE9 7F 6800          CLR     FORMAD
01156 FDEC 86 40            LDA A   #RTHS
01157 FDEE B7 6801          STA A   DRIVAD
01158 FDF1 86 80            LDA A   #CONSEL
01159 FDF3 B7 6800          STA A   FORMAD
01160 FDF6 7F 6800          CLR     FORMAD
01161 FDF9 CE 00FF          LDX     #$00FF
01162 FDFC FF F121          STX     CURCYL    SET CYL=0 HEAD=-1
01163 FDFF 86 0C            LDA A   #$0C      RESET READ+WRITE FIFO
01164 FE01 B7 6800          STA A   FORMAD
01165 FE04 7F 6800          CLR     FORMAD
01166 FE07 8D 09            BSR     CHECK
01167 FE09 24 04            BCC     RST1
01168 FE0B C6 02            LDA B   #2        RESET ERROR
01169 FE0D 20 D1            BRA     DISRET
01170 FE0F 5F      RST1   CLR B               STATUS OK
01171 FE10 20 CE   DR2    BRA      DISRET
01172                *
01173 FE12 3F      CHECK  FCB      $3F,05    PSHX
01174 FE14 37               PSH B
01175 FE15 CE 5FFF          LDX     #$5FFF    DELAY COUNT
01176 FE18 F6 6801 CHK5   LDA B    DRIVAD
01177 FE1B C4 F0            AND B   #$F0      MASK OFF BITS
01178 FE1D C8 70            EOR B   #$70      INVERT SOME
01179 FE1F 27 08            BEQ     CHK4
01180 FE21 09               DEX
01181 FE22 26 F4            BNE     CHK5
01182 FE24 0D               SEC
01183 FE25 33      CHR    PUL B
01184 FE26 3F               FCB     $3F,06    PULX
01185 FE28 39               RTS
01186 FE29 0C      CHK4   CLC
01187 FE2A 20 F9            BRA     CHR
01188                *
01189 FE2C A6 10   DISC2  LDA A    CTLSH,X   GET CYLINDER
01190 FE2E BD FEA7          JSR     GETCYL
01191 FE31 25 45            BCS     CHERRT
01192 FE33 A6 15            LDA A   CTDR,X    GET WANTED HEAD
01193 FE35 BD FEE8          JSR     GETHED
01194 FE38 A6 14            LDA A   CTDC,X    GET COMMAND
01195 FE3A 81 02            CMP A   #2        READ?
01196 FE3C 26 03            BNE     *+5       YES
01197 FE3E 7E FEFE          JMP     WRTSEC    GO WRITE
01198                *
01199 FE41 C6 03   REDSEC LDA B    #3        TRY COUNT
```

```
01200 FE43 F7 F123          STA B   TRY
01201 FE46 86 04    REDSC1 LDA A   #$04      CLEAR READ FIFO
01202 FE48 B7 6800          STA A   FORMAD
01203 FE4B 7F 6800          CLR     FORMAD
01204 FE4E A6 11            LDA A   CTLSL,X   GET WANTED SECTOR
01205 FE50 BD FF7C          JSR     CONSEC    CONVERT TO PHYS SECT.
01206 FE53 8D 27    RED     BSR     READ1S
01207 FE55 25 18            BCS     RDERRT
01208 FE57 A6 18            LDA A   CTBAH,X   GET BUFFER
01209 FE59 E6 19            LDA B   CTBAL,X
01210 FE5B A7 12            STA A   CTBPH,X   SET POINTER
01211 FE5D E7 13            STA B   CTBPL,X
01212 FE5F 3F               FCB     $3F,03    TABX
01213 FE61 C6 A0            LDA B   #160      SECTOR LENGTH
01214 FE63 B6 6000  RSWLP  LDA A   RWFIFO    MOVE DATA
01215 FE66 A7 00            STA A   X
01216 FE68 08               INX
01217 FE69 5A               DEC B
01218 FE6A 26 F7            BNE     RSWLP
01219 FE6C 7E FDE0  DR3     JMP     DISRET    FINISHED
01220                       *
01221 FE6F 7A F123  RDERRT DEC     TRY       TRY AGAIN
01222 FE72 26 D2            BNE     REDSC1
01223 FE74 C6 03            LDA B   #3        ERROR
01224 FE76 20 F4            BRA     DR3
01225                       *
01226 FE78 C6 05    CHERRT LDA B   #5
01227 FE7A 20 F0            BRA     DR3
01228                       *
01229 FE7C C6 02    READ1S LDA B   #RDCMD    READ COMMAND DRIVE
01230 FE7E F7 6801          STA B   DRIVAD
01231 FE81 F6 6800  R2S     LDA B   FORMAD    READ ACTUAL SECTOR
01232 FE84 C4 3F            AND B   #$3F
01233 FE86 11               CBA               IS IT THE WANTED?
01234 FE87 26 F8            BNE     R2S
01235 FE89 C6 03            LDA B   #READC    FORMATTER READ COMM
01236 FE8B F7 6800          STA B   FORMAD
01237 FE8E BD FE12          JSR     CHECK
01238 FE91 25 12            BCS     RER
01239 FE93 F6 6800  BUSYR  LDA B   FORMAD
01240 FE96 2B FB            BMI     BUSYR
01241 FE98 C5 40            BIT B   #$40      CRC ERROR?
01242 FE9A 26 09            BNE     RER
01243 FE9C F6 6000          LDA B   RWFIFO    SEARCH PREAMBLE
01244 FE9F C1 55            CMP B   #$55
01245 FEA1 26 02            BNE     RER
01246 FEA3 0C       ROK     CLC
01247 FEA4 39               RTS
01248 FEA5 0D       RER     SEC
01249 FEA6 39               RTS
01250                       *
01251 FEA7 36       GETCYL PSH A
01252 FEA8 B1 F121          CMP A   CURCYL    IS CYLINDER THE SAME?
01253 FEAB 27 30            BEQ     SETT1     YES
```

```
01254 FEAD 24 13          BCC    SETT2    WANTED IS HIGHER
01255 FEAF 40             NEG A
01256 FEB0 BB F121        ADD A  CURCYL   GET DIFF.
01257 FEB3 B7 6801        STA A  DRIVAD   STORE IN DRIVE
01258 FEB6 86 40.         LDA A  #DIFSEL  DIFFERENCE SELECT
01259 FEB8 B7 6800        STA A  FORMAD   ENTER DIFF.
01260 FEBB 7F 6800        CLR    FORMAD
01261 FEBE 86 20          LDA A  #RVSSK   REVERSE SEEK
01262 FEC0 20 10          BRA    SETT3
01263 FEC2 B0 F121 SETT2  SUB A  CURCYL   GET DIFF
01264 FEC5 B7 6801        STA A  DRIVAD   STORE IN DRIVE
01265 FEC8 86 40          LDA A  #DIFSEL  ENTER
01266 FECA B7 6800        STA A  FORMAD
01267 FECD 7F 6800        CLR    FORMAD
01268 FED0 86 04          LDA A  #FWDSK   FORWARD SEEK
01269 FED2 B7 6801 SETT3  STA A  DRIVAD   ENTER COMMAND
01270 FED5 86 80          LDA A  #CONSEL
01271 FED7 B7 6800        STA A  FORMAD
01272 FEDA 7F 6800        CLR    FORMAD
01273 FEDD 32      SETT1  PUL A
01274 FEDE B7 F121        STA A  CURCYL
01275 FEE1 BD FE12        JSR    CHECK
01276 FEE4 25 01          BCS    GETERR   ERROR
01277 FEE6 0C             CLC
01278 FEE7 39      GETERR RTS
01279                 *
01280 FEE8 36      GETHED PSH A
01281 FEE9 B1 F122        CMP A  CURHED   IS IT THE SAME
01282 FEEC 27 0B          BEQ    SETT10   YES
01283 FEEE B7 6801        STA A  DRIVAD
01284 FEF1 86 20          LDA A  #HEDSEL  HEAD SELECT
01285 FEF3 B7 6800        STA A  FORMAD
01286 FEF6 7F 6800        CLR    FORMAD   MAKE PULSE
01287 FEF9 32      SETT10 PUL A           RESTORE STACK
01288 FEFA B7 F122        STA A  CURHED   UPDATE CURRENT HEAD
01289 FEFD 39             RTS
01290                 *
01291                 ***********
01292                 *
01293 FEFE C6 03 WRTSEC   LDA B  #3       TRY COUNT
01294 FF00 F7 F123        STA B  TRY
01295 FF03 C6 08 WRIT1    LDA B  #8       CLEAR WRITE FIFO
01296 FF05 F7 6800        STA B  FORMAD
01297 FF08 7F 6800        CLR    FORMAD
01298 FF0B C6 10          LDA B  #16      MAKE SOME SPACE
01299 FF0D A6 11          LDA A  CTLSL,X  GET WANTED SECTOR
01300 FF0F 36             PSH A           SAVE IT A WHILE
01301 FF10 4F             CLR A
01302 FF11 B7 6000 WRIT2  STA A  RWFIFO
01303 FF14 5A             DEC B
01304 FF15 26 FA          BNE    WRIT2
01305 FF17 C6 55          LDA B  #$55     PREAMBLE
01306 FF19 F7 6000        STA B  RWFIFO
01307 FF1C E6 19          LDA B  CTBAL,X  GET BUFFER ADDRESS
```

```
                     A6
01308 FF1E 96 18              LDA A  CTBAH,X
01309 FF20 E7 13              STA B  CTBPL,X    SET POINTER BEGIN
01310 FF22 A7 12              STA A  CTBPH,X
01311 FF24 3F                 FCB    $3F,03     TABX
01312 FF26 C6 A0              LDA B  #160       SECTOR LENGTH
01313 FF28 A6 00       WSWLP  LDA A  X          MOVE DATA
01314 FF2A B7 6000            STA A  RWFIFO
01315 FF2D 08                 INX
01316 FF2E 5A                 DEC B
01317 FF2F 26 F7              BNE    WSWLP
01318 FF31 C6 10              LDA B  #16        MAKE SOME SPACE
01319 FF33 4F                 CLR A
01320 FF34 B7 6000    WRIT3   STA A  RWFIFO
01321 FF37 5A                 DEC B
01322 FF38 26 FA              BNE    WRIT3
01323 FF3A 32                 PUL A             RESTORE A
01324 FF3B 8D 3F              BSR    CONSEC      CONVERT TO PHYS NO
01325 FF3D C6 11              LDA B  #WTCMD      WRITE COMM DRIVE
01326 FF3F F7 6801            STA B  DRIVAD
01327 FF42 F6 6800    W1LP    LDA B  FORMAD      READ ACTUAL SECTOR
01328 FF45 C4 3F              AND B  #$3F
01329 FF47 11                 CBA
01330 FF48 26 F8              BNE    W1LP
01331 FF4A C6 02              LDA B  #WRITC      WRITE COMM FORMATTER
01332 FF4C F7 6800            STA B  FORMAD
01333 FF4F BD FE12            JSR    CHECK
01334 FF52 24 03              BCC    *+5
01335 FF54 7E FE78            JMP    CHERRT
01336 FF57 F6 6800    BUSYW   LDA B  FORMAD
01337 FF5A 2B FB              BMI    BUSYW       BUSY
01338 FF5C F6 F11B            LDA B  STATUS      CHECK ON WRITE?
01339 FF5F C5 40              BIT B  #$40
01340 FF61 27 05              BEQ    W1E         NO!
01341 FF63 BD FE7C            JSR    READ1S
01342 FF66 25 04              BCS    WRERRT      ERROR?
01343 FF68 5F         W1E     CLR B
01344 FF69 7E FDE0    WRTN    JMP    DISRET
01345 FF6C 7A F123    WRERRT  DEC    TRY
01346 FF6F 26 04              BNE    WE1
01347 FF71 C6 06              LDA B  #6          WRITE ERROR
01348 FF73 20 F4              BRA    WRTN
01349                 *
01350 FF75 3F         WE1     FCB    $3F,06      PULX;COPY X AGAIN
01351 FF77 3F                 FCB    $3F,05      PSHX
01352 FF79 7E FF03            JMP    WRIT1
01353                 *
01354 FF7C 37         CONSEC  PSH B
01355 FF7D 16                 TAB
01356 FF7E 58                 ASL B             MULTIPLY TOTAL BY 3
01357 FF7F 1B                 ABA
01358 FF80 81 13      CONT    CMP A  #19
01359 FF82 23 04              BLS    CONEND
01360 FF84 80 14              SUB A  #20
01361 FF86 20 F8              BRA    CONT
```

```
01362 FF88 4D         CONEND TST A              ZERO?
01363 FF89 26 02             BNE     *+4
01364 FF8B 86 13-14          LDA A   #19 20
01365 FF8D 4A               DEC A
01366 FF8E 33               PUL B
01367 FF8F 39               RTS
01368               ***************************************
01369               *
01370 FF90 0D        MCL0   FCB     $D,$A,0,0,'C,'D,'S,7
01371 FF98 0D        MCL1   FCB     $D,$A,$FF,$FF,4
01372 FF9D 0D        STRG1  FCB     $D,$A,$FF,$FF,'B,'E,'G,'A,'  ,4
01373 FFA7 0D        STRG2  FCB     $D,$A,$FF,$FF,'E,'N,'D,'A,'  ,4
01374 FFB1 0D        MTAPE1 FCB     $D,$A,$FF,$FF,$FF,'S,'1,4
01375 FFB9 0D        MTAPE3 FCB     $D,$A,$FF,$FF,'S,'9,,,4
01376 FFC2 20        MTAPE4 FCC     / MAKE DEV READY AND HIT/
01377 FFD9 20               FCC     / SPACE/
01378 FFDF 0D               FCB     $D,$A,$FF,$FF,4
01379 FFE4 49        INVLD  FCC     /INVALID RANGE/
01380 FFF1 0D               FCB     $D,$A,$FF,$FF,7,4
01381               **************************************
01382               *
01383      FFF7     PGMEND EQU     *
01384               *
01385 FFF8                  ORG     $FFF8
01386 FFF8 FA11            FDB     IO        IRQ VECTOR
01387 FFFA F827            FDB     SWIHDR    SWI VECTOR
01388 FFFC FA16            FDB     POWDWN    NMI VECTOR
01389 FFFE FB19            FDB     START     RESET VECTOR
01390               **************************************
01391               *
01392 F100                 ORG     $F100     SYSTEM RAM
01393 F100 0002     IOV    RMB     2         IRQ VECTOR IN RAM
01394 F102 0002     NIO    RMB     2         NMI VECTOR IN RAM
01395 F104 0002     SWIVEC RMB     2         SWI VECTOR IN RAM
01396 F106 0002     ACIAVC RMB     2         DEVICE VECTOR
01397 F108 0002     INSWTC RMB     2         INPUT SWITCH
01398 F10A 0002     OTSWTC RMB     2         OUTPUT SWITCH
01399 F10C 0002     BEGA   RMB     2         START ADDRESS
01400 F10E 0002     ENDA   RMB     2         ENDING ADDRESS
01401 F110 0002     TW     RMB     2         TEMP SAVE
01402 F112 0002     TSP    RMB     2         STACK SAVE
01403 F114 0001     XHI    RMB     1         BUILD ADDRESS HIBYTE
01404 F115 0001     XLO    RMB     1         IDEM LOBYTE
01405 F116 0001     CKSM   RMB     1         CHECKSUM
01406 F117 0001     TEMP1  RMB     1         AUX REG
01407 F118 0001     BYTEC1 RMB     1         BYTECOUNT 1
01408 F119 0001     BYTEC2 RMB     1         BYTECOUNT 2
01409 F11A 0001     MCONT  RMB     1         FRAME COUNT
01410 F11B 0001     STATUS RMB     1         IO STATUS FLAGS
01411 F11C 0001     TRSCNT RMB     1         TRACE COUNT
01412 F11D 0002     ERRVEC RMB     2         ERROR VECTOR
01413 F11F 0002     ERSAVE RMB     2         XSAVE ON ERROR
01414 F121 0001     CURCYL RMB     1         CURRENT CYLINDER
01415 F122 0001     CURHED RMB     1         CURRENT HEAD
```

RMDON-PRBL   Random register

```
01416 F123 0001    TRY      RMB    1         TRY COUNT FOR READ OR WRITE
01417                        *
01418        F1B4  TSTACK   EQU    IOV+180   USER STACK
01419                        *
01420        F1F0  CSTACK   EQU    IOV+240   MONITOR STACK
01421                        *
01422        F1F8  TABLE1   EQU    IOV+248   NAME BUFFER
01423                        *
01424              ************************************
01425                        END
JMPTBL  F800
XINCH   F800
XOUTCH  F803
XCONTL  F806
XBADR   F809
XBYTE   F80C
XHEX    F80F
XOTSTG  F812
XPDATA  F815
XSADR   F818
XOUT4H  F81B
XOUT2H  F81E
XOUTS   F821
XDSCIO  F824
ACIA    F000
ACIA2   F002
TRACAD  F004
SWIHDR  F827
STRT    F83A
UC      0002
UB      0003
UA      0004
UXH     0005
UXL     0006
URH     0007
URL     0008
PSHAL   F863
PSHALS  F86B
PSHALC  F876
PULAL   F87F
PULAC   F882
PULALS  F88C
TXAB    F89A
STAB    F89F
TABX    F8A4
XABX    F8AE
PSHX    F8B9
PSHXA   F8BE
PULX    F8D0
PULXA   F8DB
ADXAB   F8E6
ADABX   F8ED
ADDAB   F8F2
STAUXH  F8F8
```

```
TESTZ   F8FD
TESTZA  F901
ADDAX   F904
ADDZ    F907
ADDBX   F90B
SBXAB   F910
SBABX   F917
SUBAX   F924
SUB     F927
SUBBX   F932
INDEX   F937
MUL8    F93F
JMPTZ   F948
MUL16   F94A
MUL16L  F954
MUL16S  F95A
MPY8    F971
MPY8L   F979
MPY8S   F97D
FROM    0009
TOO     000B
MOVC    F985
MOVC1   F988
MOVC2   F99B
MOVC3   F9A3
PARM1   0009
PARM2   000B
CMPC    F9A4
CMP0    F9A7
CMP1    F9B9
CMP2    F9BF
CDONE   F9C2
MOVS    F9C9
MOVS1   F9CA
MOVS2   F9DE
MOVS3   F9E6
DSPTAB  01AD
IO      FA11
POWDWN  FA16
RDRON   FA1B
NOECHO  FA20
LOAD    FA28
LOAD3   FA2A
LOAD4   FA3D
LOAD11  FA59
LOAD15  FA65
OUTQM   FA6A
LOAD21  FA6E
C1      FA6E
OUTHL   FA71
OUTHR   FA75
OUTCH   FA7F
INCH    FA82
BADDR   FA85
```

```
BADR1   FA8F
BYTE    FA93
OUTSTG  FAA5
PDATA2  FAAA
PDATA1  FAAD
CHANGE  FAB4
CHA1    FAB8
C3      FAD1
CHA14   FAD4
CHA12   FAD5
CHA11   FAE4
INHEX   FAE8
IN1HG   FAFC
ERROR   FAFD
OUT2H   FB05
OUT2HA  FB07
OUT4HS  FB10
OUT2HS  FB12
OUTS    FB14
START   FB19
ERRSET  FB4A
SETDEV  FB50
CONTRL  FB56
CL10    FB99
CONTIN  FBBF
CL1     FBC6
SFE     FBD5
PRNTRG  FBE1
C4      FBE3
PRTREG  FBE6
INCH1   FBFF
PNHOFF  FC02
OUTCH1  FC04
RDROFF  FC07
ECHO    FC0B
ECHO1   FC10
PUNCH   FC14
PUN35   FC22
PUN11   FC28
PUN22   FC3A
PUN23   FC3C
PUN40   FC4D
PUN32   FC60
PUN50   FC71
PUNT2   FC7D
SADDR   FC82
PRINT   FCB5
PRT1    FCCB
PRT2    FCD8
SELCAR  FCF8
PRT3    FD02
PRT4    FD04
INCMD   FD06
OUTEE   FD0D
```

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OTCR   FD15
OT1    FD18
RET2   FD20
RET1   FD23
INEEE  FD24
INPUT  FD39
INCR   FD41
IN1    FD44
PNHTRL FD4D
PL1    FD50
PNCHTR FD57
C5     FD5F
OFFSET FD62
OF1L   FD71
OF2L   FD7E
OFFFIN FD8F
TRACE  FD97
TRACYC FDB8
TRACE1 FDC9
CTCTH  0000
CTCTL  0001
CTN1   0002
CTM1   000A
CTFG   000D
CTBSH  000E
CTBSL  000F
CTLSH  0010
CTLSL  0011
CTBPH  0012
CTBPL  0013
CTDC   0014
CTDR   0015
CTNSH  0016
CTNSL  0017
CTBAH  0018
CTBAL  0019
CTST   001A
FORMAD 6800
DRIVAD 6801
RWFIFO 6000
CONSEL 0080
DIFSEL 0040
HEDSEL 0020
RDCMD  0004
WTCMD  0011
RTHS   0040
READC  0003
WRITC  0002
FWDSK  0004
RVSSK  0020
DISCIO FDD5
DISRET FDE0
DISC1  FDE6
RST1   FE0F
```

DR2   FE10
CHECK   FE12
CHK5   FE18
CHR   FE25
CHK4   FE29
DISC2   FE2C
REDSEC FE41
REDSC1 FE46
R2D   FE53
RSWLP   FE63
DR3   FE6C
RDERRT FE6F
CHERRT FE78
READ1S FE7C
R2S   FE81
BUSYR   FE93
ROK   FEA3
RER   FEA5
GETCYL FEA7
SETT2   FEC2
SETT3   FED2
SETT1   FEDD
GETERR FEE7
GETHED FEE8
SETT10 FEF9
WRTSEC FEFE
WRIT1   FF03
WRIT2   FF11
WSWLP   FF28
WRIT3   FF34
W1LP   FF42
BUSYW   FF57
W1E   FF68
WRTN   FF69
WRERRT FF6C
WE1   FF75
CONSEC FF7C
CONT   FF80
CONEND FF88
MCL0   FF90
MCL1   FF98
STRG1   FF9D
STRG2   FFA7
MTAPE1 FFB1
MTAPE3 FFB9
MTAPE4 FFC2
INVLD   FFE4
PGMEND FFF7
IOV   F100
NIO   F102
SWIVEC F104
ACIAVC F106
INSWTC F108
OTSWTC F10A

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BEGA    F10C
ENDA    F10E
TW      F110
TSP     F112
XHI     F114
XLO     F115
CKSM    F116
TEMP1   F117
BYTEC1  F118
BYTEC2  F119
MCONT   F11A
STATUS  F11B
TRSCNT  F11C
ERRVEC  F11D
ERSAVE  F11F
CURCYL  F121
CURHED  F122
TRY     F123
TSTACK  F1B4
CSTACK  F1F0
TABLE1  F1F8
```

TOTAL ERRORS 00003

M6800 ASSEMBLER VERSION 1.2
ENTER PASS : 1P,1S,2P,2L,2T